REGULATING GREENHOUSE GASES UNDER THE CLEAN AIR ACT

by
Kirk Shirley

A capstone project submitted to Johns Hopkins University in conformity with the requirements for the degree of Master of Arts in Public Management

Baltimore, Maryland
April, 2016

© 2016 Kirk Shirley
All Rights Reserved

Abstract

The earth continues to get hotter as a result of anthropogenic climate change and adverse effects will increase in frequency and severity for populations and economies across the United States. There is clear scientific consensus that greenhouse gas (GHG) emissions must be dramatically decreased to effectively slow or reverse climate change. The 21st Conference of Parties (COP21) agreement in Paris represents a unique and historic opportunity for the international community, including the US and China, the world's largest emitters, to decrease GHG emissions. In the US, however, policy responses to reduce GHG emissions have been obstructed by Congress or the courts and policy alternatives must be considered. Since the legislative branch does not have the ability or will to address climate change, executive action is the most viable way forward. Using a variety of tools including the Clean Air Act (CAA) as a case study, cost-benefit analysis, forecasting, and simulations of scaling-up of state plans, analysis in this paper indicates that the best policy option available is to regulate GHG gas emissions under section 108 of the CAA by executive order of the President. Under this policy option, the Environmental Protection Agency (EPA) would set GHG emissions reduction levels that would be implemented at individual state levels, which analysis shows to be the most effective, efficient, and feasible option within the current political climate. Further, Section 108 of the CAA and the Supreme Court ruling in *Massachusetts vs. the EPA* provide a firm statutory foundation and judicial precedence for regulating GHG emissions under the CAA. As a result, President Obama should issue an executive order directing the EPA to use its authority under section 108 of the CAA to list six greenhouse gases as criteria pollutants, establish emission standards for each, and start the

rulemaking process as soon as possible. Simultaneously, the White House should start building a coalition of elected officials, states, businesses, and interest groups for a media campaign in support of this proposal.

TABLE OF CONTENTS

MEMORANDUM FOR THE PRESIDENT

FROM: Kirk Shirley, White House Climate, Conservation, and Energy Policy Advisor

SUBJECT: Policy Options to Respond to Climate Change in the Final Year of the Administration

Action Forcing Events

On December 12th, 2015, the United States and 194 other nations reached a landmark accord to dramatically reduce greenhouse gas (GHG) emissions at the 21st Conference of Parties (COP21) meeting in Paris.[1] The agreement is scheduled to be approved by member countries at the United Nations in New York on April 22, 2016[2] where the United States will commit to reduce GHG emissions economy-wide by 26-28% below 2005 levels by 2025.[3] The United States is required to decrease emission from power plants by 32% of 2005 levels based on the Clean Power Plan's final rule which was approved in August of 2015 and final State Implementation Plans (SIPs) for meeting requirements are due by September 6th, 2016.[4] The implementation of the CPP was halted by a 5-4 decision by the Supreme Court on February 9th, 2016.[5] The National Oceanic and Atmospheric Administration (NOAA) reported on January 20th, 2016 that 2015 was

[1] Justin Gills, "Nations Approve Landmark Climate Accord in Paris," New York Times, December 2015, http://www.nytimes.com/2015/12/13/world/europe/climate-change-accord-paris.html.
[2] COP21, "More Details About the Agreement," United Nations, December 2015, http://www.cop21.gouv.fr/en/moredetailsabouttheagreement/
[3] UNFCCC, "INDC Submissions –United States," United Nations, November 2015, http://www4.unfccc.int/submission.
[4] EPA, "Clean Power Plan Factsheet," Clean Power Plan, August 2015, 1.
[5] EPA, "Clean Power Plan Factsheet," 1.

the hottest year on record, by the widest margin ever,[6] and scientists are now 95% certain that human produced GHG emissions are the primary cause of this warming.[7]

Statement of the Problem

The climate of the planet is warming, atmospheric and ocean temperatures are increasing, the oceans are becoming more acidic, sea levels are rising, and glaciers and icecaps are shrinking.[8] Human activities are the dominant cause of the observed changes to the climate over the past 50 years,[9] particularly from the release of GHGs and other anthropogenic drivers such as clearing of forests, agriculture, and concrete manufacturing.[10] While the type and severity of changes to the climate varies from country to country and region to region,[11] the United States has and will continue to see significant adverse effects to life, property, and quality of life from the warming of the earth.[12] The warming will continue to provide unique challenges to human health, agriculture and food security, water availability and quality, and critical infrastructure in the United States.[13]

GHG emissions, particularly carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), have dramatically increased since the pre-industrial era and are

[6] NOAA, "State of the Climate Report," National Centers for Environmental Information, January 2016, 1.
[7] R.K. Pachauri, and L.A. Meyer, Eds. "Climate Change Report 2014: Summary for Policy Makers," The Intergovernmental Panel on Climate Change (IPPC), November 2014, 2.
[8] Pachauri and Meyer, "Climate Change Report 2014: Summary for Policy Makers," 2.
[9] Jerry Melillo, Terese Richmond, and Gary Yohe, Eds., "Climate Change Impact in the United States: The Third National Climate Assessment," US Global Change Research Program, May 2014, 7.
[10] Emily Elert, and Michael Lemonick, *Global Weirdness: Severe Storms, Deadly Heat Waves, Relentless Drought, Rising Seas, and the Weather of the Future*, (New York: Vintage, 2012), 49.
[11] Elert and Lemonick, *Global Weirdness*, 72.
[12] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 9.
[13] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 10.

concentrated in the atmosphere at levels unprecedented in the past 800,000 years.[14] The gases are increasingly trapping heat in the atmosphere leading to a warming of surface temperatures and rising sea levels as seawater molecules expand and glaciers and icecaps melt. US average temperatures have increased by 1.3°F to 1.9°F since 1895 and the last decade was the hottest on record.[15] Sea levels have risen by about 8 inches since 1870[16] and the oceans have become 30% more acidic from absorbing CO2 from the atmosphere, which has a significant effect on many marine animals.[17] The changing climate has also lengthened the growing season nationally by an average of two weeks since 1900, with the Sonoma region of California increasing a full 66 days since 1950.[18] Increase in temperatures in the US has reduced snow cover and ice in lakes, seas, and glaciers over the last several decades.[19] Average US precipitation and heavy downpours have both increased since 1900, and when coupled with higher temperatures and evaporation from soil and water, the water cycle has sped up, increasing the risk of floods and droughts.[20] Human-induced climate change has influenced extreme weather and climate events since 1950, with heat waves increasing in frequency and intensity, particularly in the west, decreases in cold waves everywhere, and regional increases in floods and droughts.[21] The

[14] Pachauri and Meyer, "Climate Change Report 2014," 4.
[15] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 8.
[16] NASA, "Facts: Sea Level," NASA Global Climate Change, Accessed January 2016, http://climate.nasa.gov/vital-signs/sea-level/
[17] NOAA, "What is Ocean Acidification?" NOAA Carbon Program, Accessed January 2016, http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F
[18] Elert and Lemonick, *Global Weirdness*, 99.
[19] EPA, "Snow and Ice," Climate Change Indicators in the US, Accessed January 2016, http://www3.epa.gov/climatechange/pdfs/CI-snow-and-ice-2014.pdf.
[20] Elert and Lemonick, *Global Weirdness*, 154.
[21] Pachauri and Meyer, "Climate Change Report 2014," 7.

droughts in the western states over the past decade "represent the driest conditions in 800 years."[22]

The aforementioned changes to the climate are projected to increase dramatically with the magnitude primarily dependent on the amount of GHG emitted and how sensitive the planet is to those emissions.[23] In the US, the surface temperatures are expected to rise another 2°F to 4°F under low emission scenarios and up to 12°F under high emission scenarios by the end of the century.[24] The sea levels are expected to rise at least another 11 inches by 2100 and up to 4 feet under certain models.[25] Heat waves and droughts are projected to become more intense and frequent everywhere,[26] with the southwest possibly transitioning to dustbowl-like conditions.[27] Flooding and heavy precipitation events are also projected to increase in all regions, further accelerating the water cycle.[28] The ocean will become more acidic, freshwater will become more scarce, and changes in temperature and rainfall are expected to reduce crop production overall.[29]

The current and projected changes to the climate will continue to have adverse effects to life, property, and quality of life for citizens of the United States. Increasingly common and intense heat waves will trigger more heat-related illnesses and deaths as

---

[22] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 38.
[23] Pachauri and Meyer, "Climate Change Report 2014," 10.
[24] EPA, "Future Climate Change," Climate Change Program, Accessed January 2016, http://www3.epa.gov/climatechange/science/future.html.
[25] Anny Cazenave, ed., "Future sea level rise constrained by observations and long-term commitment," National Academy of Sciences, January 2016, 1.
[26] NASA, "The Consequences of Climate Change," NASA Global Climate Change, http://climate.nasa.gov/effects.
[27] Peter Fawcett, "Extended Mega droughts in the Southwestern United States," Nature, February 2011, 1.
[28] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 70.
[29] Elizabeth Marshall and Marcel Aillery, "Climate Change, Water Scarcity, and Adaptation," USDA ERS, November 2015, 1.

well as worsening air pollution.[30] The danger of infectious diseases will increase from warming temperatures in the US,[31] as is evident with the recent return of Dengue Fever in the southeast.[32] More frequent and intense droughts will lead to larger wildfires and longer fire seasons,[33] which are detrimental to human health and property. California's devastating droughts of recent years, which are linked to human-induced warming, will become more severe.[34] Droughts are harmful for the entire ecosystem and can have particularly adverse effects on crops, livestock, human health, and water availability.[35] To compound this issue, freshwater will become scarcer and underwater reservoirs will decrease, which is already occurring at a rate three times greater than any time during the 20th century.[36]

Rising sea levels increase coastal flooding and surges during storms endangering human life and property. Almost five million Americans and hundreds of billions of dollars in property are located at less than four feet above tide levels.[37] The increase in storm surges are expected to cause 20% more property damage by 2030.[38] Current models show hurricanes will increase in strength as a result of the warming ocean with more Category 4 and 5 hurricanes affecting populations on the eastern seaboard and gulf

[30] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 12.
[31] WHO, "Climate Change and Health," UN, September 2015, http://www.who.int/mediacentre/factsheets/fs266/en/
[32] Dina Maron, "Dengue Fever Makes Inroads into the U.S," Scientific America, November 2014, 1.
[33] Fernanda Santos, "Dry Days Bring Ferocious Start to Fire Season," NY Times, August 2015, http://www.nytimes.com/2015/08/02/us/dry-days-in-west-bring-ferocious-start-to-fire-season.html?_r=0
[34] S.Y. Wang, Lawrence Hipps, Robert Gilles, and Jin-Ho Yoon. "Probable Causes of the abnormal ridge accompanying the 2013-2014 California drought: ENSO precursor and anthropogenic warming footprint," Geophysical Research Letters, Feb 2014, 6-7.
[35] National Drought Mitigation Center, "Types of Drought Impacts," University of Nebraska, Accessed March 2016, http://drought.unl.edu/droughtforkids/howdoesdroughtaffectourlives/typesofdroughtimpacts.aspx
[36] Reuters, "Drop in US Underground Water Levels Has Accelerated –USGS," Reuters Regulatory News, May 2013, http://www.reuters.com/article/usa-water-idUSL2N0E11VC20130520
[37] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 10.
[38] Elert and Lemonick, *Global Weirdness*, 142.

coast.[39] Flooding and heavy precipitation events are also projected to continue their upward trend and increase related injuries, waterborne diseases, food contamination, and property loss.[40] All of the aforementioned extreme weather events will increasingly damage critical infrastructure such water, energy, and transportation facilities.[41]

Climate disruptions to agriculture have increased over the past 40 years and scientists expect them to continue for the next 25 years and beyond. While the US has successfully adapted in most cases to those changes, it is expected that after mid-century crop and livestock production will decrease as a result of stress due to weeds, plant pests and diseases, and degradation of soil and loss of water assets due to temperature changes and the accelerated water cycle.[42] The overall economy will also suffer as scientists expect that global economic output will drop by 23% by 2100 if nothing is done to combat climate change, with the US fairing worse than most of the developed world.[43]

History

The history of climate change is defined by one major event: the development of an efficient version of the steam engine in the late eighteenth century by James Watt.[44] These new engines ran on oil or coal, releasing CO2 into the atmosphere, and helped to

[39] John McQuad, "Hurricanes and Climate Change," PBS, November 2012, http://www.pbs.org/wgbh/nova/earth/hurricanes-climate.html.
[40] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 12.
[41] The White House, "The National Security Implications of a Changing Climate," White House, May 2015, 3.
[42] EPA, "Agriculture and Food Supply," Climate Change Program, February 2016, http://www3.epa.gov/climatechange/impacts/agriculture.html.
[43] David Rotman. "Hot and Wild," MIT Technology Review, Jan/Feb 2016, 75.
[44] Heather Whipps, "How the Steam Engine Changed the World," Live Science, June 2008, http://www.livescience.com/2612-steam-engine-changed-world.html

shepherd in the industrial revolution and dramatic population growth.[45] CO2 levels in the atmosphere went from 280 parts per million (ppm) in 1800 to over 400 ppm today,[46] an increase of over 40%, and higher than they have been in 400,000 years.[47] Other GHGs also increased over the next two centuries as CH4, N2O, and others were produced from farming, landfills, and chemical plants,[48] while simultaneously forests were cleared, decreasing the amount of carbon captured naturally.

These anthropogenic drivers, particularly CO2 emissions, steadily increased temperatures in the US, most of which has occurred since 1970.[49] While scientists as far back as 1890s saw the possible global impact of burning fossil fuels, it wasn't until 1958 that scientists had precise instruments indicating that CO2 levels were rising in the atmosphere.[50] As temperatures began to increase in the 1970s, consensus started to build in the scientific community around the possible effects of GHGs to the climate.[51] By 1988, there was general scientific agreement that CO2 was dramatically increasing in the atmosphere, it was increasing surface temperatures, and it would continue to do so into the 21st century.[52] The temperature rises in the 1980s began to bring the issue of climate change to the forefront of the media and public attention. In response, industry and other interests created a well-organized opposition to the science itself and any potential policy

[45] Elert and Lemonick, *Global Weirdness*, 38.
[46] NOAA, "Trends in Atmospheric CO2," Earth System Research Lab, February 2016, http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html
[47] NASA, "The Relentless Rise of Carbon Dioxide," NASA Global Climate Change, Accessed February 2016,http://climate.nasa.gov/resources
[48] IPPC, "Changes in Atmospheric Carbon Dioxide, Methane and Nitrous Oxide," UN, Accessed March 2016, https://www.ipcc.ch/publications_and_data/ar4/wg1/en/tssts-2-1-1.html
[49] National Climate Assessment, 15.
[50] The Guardian, "When Did We Discover Man-Made Climate Change?" The Ultimate Climate Change FAQ, March 2011, http://www.theguardian.com/environment/2011/mar/02/when-discover-climate-change
[51] Spencer Weart, "The Discovery of Global Warming." Scientific American, August 2012, http://www.scientificamerican.com/article/discovery-of-global-warming/
[52] Scientific American, "The Discovery of Global Warming," 1.

responses.[53] The history of the problem has continued on the same path since: the scientific community continues to accumulate evidence of human induced climate change,[54] opposition groups continue to battle against the science and regulatory action in the public arena, and temperatures continue to rise, with 14 of the 15 warmest years on record occurring over the past 15 years.[55]

The world has attempted to find a unified approach to address climate change over the past few decades with the United Nations leading the effort, but these efforts have generally have failed to make any lasting progress. On March 21, 1994, the United Nation Framework Convention on Climate Change (UNFCCC) was adopted with almost universal approval including support from the George H.W. Bush Administration.[56] The Convention stated that global warming is real, is caused by manmade GHGs, and obligated members to meet annually at the COPs to "negotiate a multilateral response to climate change."[57] At COP3 in December of 1997, the first major GHG emission reduction treaty, the Kyoto Protocol, was adopted, [58] but the success of the treaty was significantly limited. The treaty did not enter into force until February 16th, 2005, and the first commitment period started in 2008, over ten years after adoption.[59] The protocol was only supported by the European Union and 37 other industrial countries and had a narrow emission reduction target of 5% of 1990 levels by 2012.[60] While the Clinton

[53] The Guardian, "The Ultimate Climate Change FAQ," 1.
[54] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 7.
[55] US EPA. "Clean Power Plan Overview," EPA, August 2015, 2.
[56] UNFCCC, "Timeline," United Nations, Accessed February 2016, http://unfccc.int/timeline/
[57] UNFCCC, "Timeline," 1.
[58] The Guardian, "What is the Kyoto Protocol and has it Made Any Difference?" The Ultimate Climate Change FAQ, March 2011, http://www.theguardian.com/environment/2011/mar/11/kyoto-protocol
[59] UNFCCC, "Kyoto Protocol," United Nations, Accessed February 2016, http://unfccc.int/kyoto_protocol/items/2830.php
[60] UNFCC, "Kyoto Protocol," 1.

Administration actively supported the Protocol, it never went for Congressional approval as the Senate unanimously passed the Byrd-Hagel Resolution, which stated opposition to a national emission reduction plan unless similar commitments were made by developing countries[61] such as China, India, and Brazil, who were also absent from the Kyoto Protocol. The second commitment period of the protocol, the Doha Amendment, increased the reduction commitment to 18% of 1990 levels by 2020, but again was not able to garner signatures from the two biggest GHG emitters, the United States and China.[62] The Paris Accord at the COP21 was able to attract the United States and China as they joined another 159 countries to pledge significant reductions.[63]

In the US, federal policy action to slow or mitigate climate change has not been much more fruitful. No federal legislation has been passed in the United States that "requires public entities or private companies to mitigate their impact on global climate."[64] There are some current laws codified from legislation that encourage behavior to limit climate change, but they have been limited in scope and impact. Interestingly enough, the most significant legislation to address climate change was passed over 45 years ago and did not once mention the warming of the globe or GHGs. The US Clean Air Act (CAA) of 1970 was signed by President Nixon on Dec 31, 1970 and was intended to regulate the pollutants coming from stationary and mobile sources, with the

[61] US Congress, "S.Res 98," Library of Congress, Accessed February 2016, https://www.congress.gov/bill/105th-congress/senate-resolution/98
[62] EPA, "Greenhouse Gas Emissions Data," Climate Change Program, http://www3.epa.gov/climatechange/ghgemissions/global.html
[63] UNFCCC, "INDC Submissions," 1.
[64] Columbia Law, "Climate Change Laws in the United States," Sabin Center for Climate Change, December 2013, http://web.law.columbia.edu/climate-change/resources/climate-change-laws-world/united-states-america#Federal Laws

primary purpose of protecting public health and welfare from hazardous air pollutants.[65] The CAA identified two types of national ambient air quality standards (NAAQS) under section 109, primary and secondary, with the former focusing on protecting public health, including sensitive groups (i.e. children, elderly, asthmatic populations), and the latter focusing on general public welfare, including "damage to farm crops and vegetation and damage to buildings."[66] The precursors to the CAA, the Air Pollution Control Act of 1955 and the Air Quality Act of 1967, set the stage for regulatory action on pollutants, but were far more limited.[67]

In part to assist with the implementation of the CAA, President Nixon established the Environmental Protection Agency (EPA)[68] under the Reorganization Plan No.3 of 1970 which was submitted to the Senate and House of Representatives on July 9th, 1970 and was effective as of December 2nd, 1970.[69] While the focus of the CAA and the EPA initially were to mitigate pollutants that showed an immediate harm to humans and the environment, President Nixon set the stage for a broader reading with his message to Congress in the Reorganization Plan, "Congress, the Administration and the public all

[65] EPA, "Summary of the Clean Air Act," EPA Laws and Regulations, Accessed February 2016, http://www.epa.gov/laws-regulations/summary-clean-air-act
[66] Tianjia Tang, Bob O'Loughlin, Mike Roberts and Edward Dancausse, "Feral Air Quality Legislation Federal Air Quality Legislation," Department of Transportation, Accessed February 2016, https://www.fhwa.dot.gov/resourcecenter/teams/airquality/teamaq_law.pdf
[67] EPA, "Evolution of Clean Air Act," Clean Air Act Overview, Accessed February 2016, http://www.epa.gov/clean-air-act-overview/evolution-clean-air-act
[68] Richard Nixon, "Statute 46, Pg2086," Government Printing Office, July 1970, https://www.gpo.gov/fdsys/pkg/STATUTE-84/pdf/STATUTE-84-Pg2086.pdf
[69] Federal Register, "EPA," US Government, Accessed February 2014, https://www.federalregister.gov/agencies/environmental-protection-agency

share a profound commitment to the rescue of our natural environment, and the preservation of the Earth as a place both habitable by and hospitable to man."[70]

The newly created EPA with authority from the CAA regulated emissions of 189 pollutants and initially classified four pollutants (carbon monoxide, sulfur oxide, nitrogen oxide, and ozone) as "criteria pollutants" under section 108 as they were particularly harmful to human health and welfare and were emitted from numerous sources.[71] Lead was added as a criteria pollutant in 1976 as the Second Circuit Court found in *Natural Resources Defense Council v. Train* that the EPA must list a pollutant as a criteria pollutant once the EPA has determined that it has adverse effects on public health and welfare and it comes from numerous or diverse sources as cited under section 108 of the CAA.[72] Once a pollutant receives criteria designation, the EPA issues air quality standards and NAAQS for the pollutant under section 109 of the CAA based on the latest scientific knowledge available.[73] States then are required to develop and submit SIPs for meeting NAAQS for the each pollutant, with the EPA having final judgment on each plan, as mandated under section 110 of the CAA.[74]

From 1970 to 1990, there were some important legislative successes of note, including the Energy Policy and Conservation Act of 1975, which established Corporate

[70] EPA, "Reorganization Plan 3 of 1970," About EPA, Accessed February 2016, http://www.epa.gov/aboutepa/reorganization-plan-no-3-1970
[71] EPA, "Initial List of Hazardous Air Pollutants," Air Pollutants, Accessed February 2016, http://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications
[72] Judge Stewart, "Natural Resources Defense Council v. Train," US District Court New York, March 1976, 1-2.
[73] 42 US Code § 7408, "Air quality criteria and control techniques," Cornell Law, Accessed March 2016, https://www.law.cornell.edu/uscode/text/42/7408
[74]42 US Code § 7410m, "State Implementation Plans For National Primary And Secondary Ambient Air Quality Standards," Cornell Law, Accessed March 2016, https://www.law.cornell.edu/uscode/text/42/7410

Average Fuel Economy (CAFE) standards,[75] and the National Forest Management Act and the Federal Land Policy Management Act of 1976, which helped to keep forests, natural anthropogenic blockers, intact.[76] However, the next most important legislation of this time period did not come until the CAA was amended and signed by President George H.W. Bush on November 15th, 1990.[77] The amendment was meant to address four major threats: acid rain, urban air quality, toxic air emissions, and stratospheric ozone depletion.[78] Of particular note is the ozone layer provision, which phased out the use of substances that were particularly damaging to the ozone, such as CFCs, which are also GHGs. This legislation is significant as it showed Congress and the White House taking action to address a global issue that had potential long term adverse effects to the planet through the CAA.

Over the next 20 years, most of the climate related legislation focused on encouraging efficiency, alternative fuels, and renewable energies. The Energy Policy Act (EPAct) of 1992, which was signed by George H.W. Bush on October 24, 1992, represented the first major step to decrease US dependency on petroleum, a key source of GHGs, by encouraging "alternate fuels, renewable energy, and energy efficiency"[79] in buildings, utilities, and household, at the federal and state level.[80] Also of note in the 1990s, Particulate Matter (PM) was added as the sixth criteria pollutant by the EPA in

[75] Department of Energy, "Key Legislation," Alternative Fuels Data Center, Accessed February 2016, http://www.afdc.energy.gov/laws/key_legislation
[76] US Forest Service, "The US Forest Service – An Overview," US Forest Service, January 2006. 32.
[77] US Congress, "S 1630," Library of Congress, Accessed February 2016, http://thomas.loc.gov/cgi-bin/bdquery/z?d101:SN01630:@@@L&summ2=m&#major actions
[78] EPA, "1990 Amendment Highlights," Clean Act Overview, Accessed February 2016, http://www.epa.gov/clean-air-act-overview/clean-air-act-highlights-1990-amendments
[79] Department of Energy, "Key Legislation," 1.
[80] US Congress, "HR 776," Library of Congress, Accessed February 2016, http://thomas.loc.gov/cgi-bin/bdquery/z?d102:HR00776:@@@D&summ2=m&

May of 1997 under section 108 of the CAA.[81] In 2005, the EPAct was amended and was signed by George W. Bush on August 8th, 2005, and furthered the spirit of its predecessor by implementing tax incentives, grant programs and other initiatives to "promote alternative fuels and advanced vehicles production."[82] Again, the Energy Independency and Security Act (EISA) of 2007 which was signed by George W. Bush on December 19, 2007, built off previous bills. The act set a mandatory Renewable Fuel Standard requiring a certain amount of renewably energy production, increased CAFE standards, and set appliance and lighting efficiency standards.[83]

In 2009, the American Recovery and Reinvestment Act (ARRA) passed, representing both the most significant legislative action to address climate change since the 1990 amendment of the CAA and the last significant legislative action by Congress to address climate change. Under the context of a historic recession, newly elected President Obama signed the ARRA on February 17th, 2009 to stimulate the economy and address a broad array of legislative priorities.[84] The bill provided $35.7 billion towards activities the Congressional Budget Office (CBO) defined as related to climate change, representing 36% of total appropriations towards climate change from 1998 to 2009.[85] Spending in the bill focused on providing subsidies to technologies to reduce GHG

[81] Federal Register, "40 CFR Part 50," US Government, Accessed March 2016, https://www3.epa.gov/ttn/caaa/t1/fr_notices/pmnaaqs.pdf
[82] Department of Energy, "Key Legislation," 1.
[83] EPA, "Energy Independence and Security Act," Laws and Regulations, Accessed February 2016, http://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act
[84] CBO, "Estimate Impact of the American Recovery and Reinvestment Act," US Congress, February 2012, 5.
[85] CBO, "Federal Climate Change Programs: Funding History and Policy Issues," US Congress, March 2010, 12.

emissions, studying and monitoring climate change, and weatherization and other conservation efforts.[86]

Before and after ARRA, there has been a plethora of failed attempts by Congress to address GHGs and emissions, probably none with as much promise as the American Clean Energy Security Act (ACES) of 2009. With a Democratic President and majorities in the House and Senate, HR 2454 passed the house by 219 to 212 on June 26th, 2009.[87] Unlike the ARRA which passed a few months earlier under the same Congress, ACES was never brought to the floor of the Senate for vote or even debate.[88] The bill would have established a cap-and-trade system for GHGs emissions, to gradually reduce emissions to 17% below 2005 levels by 2020 and 83% below 2005 by 2050, among many other clean energy and energy efficiency programs.[89]

With the legislative branches' inability to substantially address climate change beyond efficiencies and incentives, President Obama announced the Climate Action Plan on June 25th, 2013, instructing the EPA through an executive memorandum to set standards for carbon emissions for power plants, which represents 40% of all GHG emissions in the US.[90] While there had been a few other critical executive actions to combat climate change, such as the Presidential Memorandum on May 21, 2010 to expand CAFE standards[91] and Executive Order 13154 which intended to reduce the GHG

[86] CBO, "Federal Climate Change Programs," 11.
[87] US Congress, "HR 2454," Library of Congress, Accessed February 2016, http://thomas.loc.gov/cgi-bin/bdquery/z?d102:HR00776:@@@D&summ2=m&
[88] US Congress, "HR 2454," 1.
[89] EPA, "HR 2454." Office of Atmospheric Programs, Accessed February 2016, http://www3.epa.gov/climatechange/Downloads/EPAactivities/HR2454_Analysis.pdf
[90] President Obama, "Power Sector Carbon Pollution Standards," The White House, June 2013, 1.
[91] President Obama, "Presidential Memorandum Regarding Fuel Efficiency Standards," The White House, May 2010, 1.

emissions of the Federal government,[92] this memorandum was by far the most far reaching.

The memorandum was legally justified based on the Supreme Court's landmark ruling on April 2, 2007 in *Massachusetts vs EPA*, which stated that GHGs are air pollutants, a danger to human health, and can be regulated by the EPA under the CAA.[93] Similar to the President's 2013 Memorandum, this ruling was by far the most important move by the judicial branch towards combating climate change. Based on the ruling, the EPA made an "endangerment finding" on December 7th, 2009 and classified six GHGs as air pollutants that harm human health and welfare, specifically CO2, CH4, N2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).[94] Before the President's memorandum, the EPA had already started to move forward with enforcing aspects of the ruling on the transportation sector, particularly vehicle emissions,[95] but had not yet addressed the single biggest GHG emitters, power plants.

On June 2nd, 2014, the EPA proposed the Clean Power Plan (CPP) to cut carbon emissions from power plants as directed by the President's Climate Action plan. The final rule of the CPP was announced on August 3, 2015 and set standards to reduce CO2 emissions by 32% from 2005 levels by 2030. Modeled on the NAAQS process in the CAA,[96] states are required to submit SIPs for meeting emission requirements by September 6th, 2016, and those that did not submit plans would be provided one directly

[92] President Obama, "Executive Order 13514," The White House, October 2009, 1.
[93] Justice Stevens, "Massachusetts Et Al. V. Environmental Protection Agency Et Al," US Supreme Court, April 2007, 1.
[94] National Archives and Records Administration, "40 CFR Chapter I," Federal Registrar, December 2009, 3.
[95] President Obama, "Power Sector Carbon Pollution Standards," 1.
[96] 42 US Code § 7411(d), "Standards of Performance for New Stationary Sources," Cornell Law, Accessed March 2016, https://www.law.cornell.edu/uscode/text/42/7411

from the EPA.[97] President Obama called the plan the "the biggest, most important step we have ever taken to address climate change."[98]

On February 9th, 2016, CPP was halted when the Supreme Court by a 5-4 vote ordered a temporary stay on the implementation of the regulation as it was challenged in court by 29 states and "dozens of corporations and industry groups."[99] To further complicate the legal situation, Justice Scalia died four days later, leaving the court at a 4-4 split on whether the CPP should be allowed to proceed.[100] The appellate panel, which unanimously rejected the same request for a stay of the CPP, is scheduled to hear arguments on the case on June 2nd, 2016, and decide whether to again reject the stay and possibly send the case back to the Supreme Court without Justice Scalia's decisive vote.[101]

Background

Review of Current Policy

There are dozens of federal incentives, laws and regulations, and programs related to climate change, but most have a limited scope and focus primarily on energy efficiency,

[97] EPA, "Clean Power Plan Factsheet," 1.
[98] Ashley Gold, "What Does Obama's Climate Change Plan Do?" BBC, August 3, 2015, 1. http://www.bbc.com/news/world-us-canada-33762891
[99] Adam Liptak, "Supreme Court Deals Blow to Obama's Efforts to Regulate Coal Emissions," New York Times, February 2016, http://www.nytimes.com/2016/02/10/us/politics/supreme-court-blocks-obama-epa-coal-emissions-regulations.html?_r=0
[100] Lawrence Hurley, "Scalia's death boosts legal chances for Obama's climate plan," Reuters, February 2016, http://www.reuters.com/article/us-usa-court-carbon-idUSKCN0VP0FH
[101] Lawrence Hurley and Valerie Volcovici, "US Supreme Court Blocks Obama's Clean Power Plan," Scientific American, February 2016, http://www.scientificamerican.com/article/u-s-supreme-court-blocks-obama-s-clean-power-plan/

renewable energy incentives, and alternative fuels.[102] These policies have saved a significant amount of GHG emissions from entering the atmosphere, but even with them in place, emissions have risen by 6% overall compared to 1990 levels.[103] To fully understand the complex patchwork of federal policies related to climate change, it is useful to review major policies by sources of GHG emissions. In the United States, 31% of GHG emissions come from electricity production, 27% from transportation, 21% from industry, 12% from residential and commercial, and 9% from agriculture.[104]

For the agriculture sector, the two most prominent policies, albeit limited and voluntary, that could address GHG emissions are the Conservation Reserve Program (CRP) and Environmental Quality Incentives Program (EQIP).[105] The CRP provides farmers with a yearly rental payment in order to halt agricultural activities on environmentally sensitive land[106] and the EQIP provides financial and technical assistance to farms to implement conservation practices.[107] In 2014, the EQIP program dispersed $1.3b,[108] and the CRP was limited to 27.5 million acres.[109] Both programs had relatively low participation rates as a result of geography and practice restrictions, and

[102] Department of Energy, "Fed Summary," Alternative Fuels Data Center, Accessed February 2016, http://www.afdc.energy.gov/laws/fed_summary
[103] EPA, "Greenhouse Gas Emissions Overall," Climate Change Program, http://www3.epa.gov/climatechange/ghgemissions/sources.html
[104] EPA, "Greenhouse Gas Emissions Overall," 1.
[105] USDA, "The Role of Agriculture in Reducing Greenhouse Gas Emissions," Economic Research Service, Accessed February 2016, http://www.ers.usda.gov/media/140711/eb15_1_.pdf
[106] USDA, "Conservation Reserve Program," Farm Service Agency, Accessed February 2016, http://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/
[107] USDA, "Environmental Quality Incentives Program," Natural Resource Conservation Service, Accessed February 2016, http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/
[108] USDA, "Environmental Quality Incentives Program," 1.
[109] Megan Stubs, "Conservation Reserve Program (CRP): Status and Issues," CRS, August 2014, 1.

limited funding.[110] Overall, GHG emissions from agriculture have increased by 17% since 1990 with the majority coming in the form of CO2, CH4, and N2O.[111]

Similar to the agriculture sector, policies to reduce GHG emissions in the industrial sector (manufacturing, factories, etc.) are limited and voluntary. The sector emits a large variety of GHG including CO2, CH4, N2O, HFCs, PFCs, and SF6.[112] On a whole, the industrial sector has taken advantage of the ENERGY STAR program administered by the EPA, which has decreased GHG emissions by 36 million metric tons since 2000 through 750 participating companies.[113] Companies are incentivized to participate in ENERGY STAR and other efficiency programs as these measures reduce operation costs, and have been somewhat successful, as GHG emissions from the industrial sector have decreased by almost 12% compared to 1990 levels.[114]

For residential and commercial sectors, current policy is focused on improving energy efficiency through tax incentives. The two most important residential incentives are the Nonbusiness Energy Property Credit, which provides a 10% credit for certain energy-efficient improvements in the home up to $500,[115] and the Residential Renewable Energy Tax Credit, which allows taxpayer to claim a credit of up to 30% of the costs for

[110] C2ES, "Agriculture's Role in Addressing Climate Change," Center for Climate and Energy Solutions, Accessed February 2016, http://www.c2es.org/publications/agricultures-role-addressing-climate-change
[111] EPA, "Greenhouse Gas Emissions Agriculture," Climate Change Program, Accessed February 2016, http://www3.epa.gov/climatechange/ghgemissions/sources/agriculture.html
[112] EPA, "Overview of Greenhouse Gases," Climate Change Program, Accessed February 2016, http://www3.epa.gov/climatechange/ghgemissions/gases.html
[113] Department of Energy, "Reducing Greenhouse Gas Emissions by Advancing Industrial Energy Efficiency," Energy Star, Accessed February 2016, https://www.energystar.gov/sites/default/files/tools/Reducing%20GHG%20Emissions%20by%20Advancing%20Industrial%20EE%202000-2015.pdf
[114] EPA, "Greenhouse Gas Emissions Industry," 1.
[115] IRS, "Nonbusiness Energy Property Credit," Credits and Deductions, Accessed February 2016, https://www.irs.gov/Credits-&-Deductions/Individuals/Nonbusiness-Energy-Property-Credit

installing solar and geothermal systems in their homes.[116] For commercial enterprises, the Energy-Efficient Commercial Buildings Tax Deduction provides companies a $1.80 per square foot tax deduction if buildings are constructed or reconstructed to save at least 50% of energy costs for heating, cooling, and interior lighting.[117] While energy efficiency incentives have shown to reduce emission rates,[118] GHG emissions, including CO2, CH4, and N2O, from homes and business have actually increased by about 1% overall compared to 1990 levels.[119]

For the transportation sector, meaningful policies are in place to reduce GHG from vehicles, which represents 83% of GHG emissions in the sector.[120] The Presidential Memorandum on May 21, 2010 requested the National Highway Traffic Safety Administration (NHTSA) and EPA to develop a coordinated national program to further expand the reduction of GHG from vehicles based on CAFE standards under the CAA and EISA.[121] Based on the Presidential Memorandum and subsequent rulemaking, average fuel economies will continue to increase to 54.6 mpg for cars and light duty trucks by 2025,[122] which will reduce GHG emissions, particularly CO2, by 2 billion

---

[116] IRS, "Residential Energy Efficient Property Credit," Credits and Deductions, Accessed February 2016, https://www.irs.gov/Credits-&-Deductions/Individuals/Residential-Energy-Efficient-Property-Credit
[117] DOE, "Energy-Efficient Commercial Buildings Tax Deduction," Tax Deductions, Accessed February 2016, http://energy.gov/savings/energy-efficient-commercial-buildings-tax-deduction.
[118] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 14.
[119] EPA, "Greenhouse Gas Emissions Commercial/Residential," Climate Change Program, Accessed February 2016,
http://www3.epa.gov/climatechange/ghgemissions/sources/commercialresidential.html
[120] EPA, "US Transportation Sector Greenhouse Gas Emissions," Office of Transportation and Air Quality, Accessed February 2016, http://www3.epa.gov/otaq/climate/documents/420f15032.pdf
[121] President Obama, "Presidential Memorandum Regarding Fuel Efficiency Standards," The White House, May 2010, 1.
[122] DOT, "Corporate Average Fuel Economy (CAFE) Standards," Mission & Sustainability, Accessed February 2016, https://www.transportation.gov/mission/sustainability/corporate-average-fuel-economy-cafe-standards

metric tons from 2017 through 2025.[123] The standard for medium and heavy duty vehicles is still under the rulemaking process and varies by type and use of vehicle, but the agencies anticipate a reduction of GHG emissions by 1 billion metric tons by model year 2027.[124] While significant progress has been made, GHG gas emissions, particularly CO2, from the transportation sector have actually increased by 16% compared to 1990 levels as fuel efficiencies have not kept pace with increased demand for travel.[125]

The Clean Power Plan is not only the most significant policy in place to reduce GHG emissions for the electricity production sector, but across all sectors. The CPP represents "the first-ever national standards that address carbon pollution from power plants," which are the biggest GHG emitters.[126] The state implementation component of the CPP was modeled on the SIP process for NAAQS in section 110 of the CAA, which has shown to be exceptionally effective for reducing emissions of a variety of common and toxic pollutants over the past 40 years.[127] Assuming the plan is fully in place by 2030, CO2 from the sector will be 32% below 2005 levels, SF6 will be down to 90% of 2005 levels, and N2O will be 72% lower.[128] However, with the halt by the Supreme Court and the SIP deadline delayed indeterminately, the success of this policy will not likely be known until the next administration.

---

[123] EPA, "EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks," Regulatory Announcements, August 2012, 1.
[124] EPA, "Propose Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond," Regulatory Announcements, June 2015, 1.
[125] EPA, "Greenhouse Gas Emissions Transportation," Climate Change Program, Accessed February 2016, http://www3.epa.gov/climatechange/ghgemissions/sources/transportation.html
[126] EPA, "Clean Power Plan Factsheet," 1.
[127] EPA, "Progress Cleaning the Air and Improving People's Health," CAA Overview, Accessed March 2016, https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#pollution
[128] EPA. "Clean Power Plan Overview," EPA, August 2015. 2-3.

Also under the electricity production sector, there are two tax credits that have been critical to the growth of the clean energy industry. The Renewable Electricity Production Tax Credit (PTC) provides qualified renewable energy sources (wind, solar, biomass, etc.) with a tax credit of 2.3 cents per kWh produced for the first ten years of operations.[129] The business energy Investment Tax Credit (ITC) provides a tax credit for business related investments at a rate of 10% for geothermal and 30% for wind, fuel cell, and solar technologies.[130] These tax credits lower the cost for renewable companies to operate and grow, which makes them more competitive compared to fossil fuel energy providers. Regardless of these efforts, GHG emissions from electricity production on a whole, which includes CO2, CH4, N2O, and SF6, have increased by about 11% compared to 1990 levels as demand continues to grow.[131]

Some additional policies of note from presidential directives are President Obama's executive order on March 19th, 2015, mandating the federal government to decrease its GHG emissions by 40% by 2025.[132] The program just started in FY16,[133] so the full potential will not be realized until the next administration. Also, on November 1, 2013, President Obama issued an executive order to create the Council on Climate Preparedness and Resilience, which includes representation from agencies across the

[129] DOE, "Renewable Energy Tax Credit," Tax Deductions, Accessed February 2016, http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc
[130] DOE, "Business Energy Investment Tax," Tax Deductions, Accessed February 2016, http://energy.gov/savings/business-energy-investment-tax-credit-itc
[131] EPA, "Greenhouse Gas Emissions Electricity," Climate Change Program, Accessed February 2016, http://www3.epa.gov/climatechange/ghgemissions/sources/electricity.html
[132] President Obama, "Executive Order 13514," 1.
[133] President Obama, "Executive Order 13514," 1.

federal government and focuses on integrating climate resiliency into executive programs while requiring individual agencies to update adaption plans annually.[134]

Principal Players and Key Constituents

As a result of the possible ramifications of climate change to US populations and the economy, it could be argued that every single individual in the United States is a constituent of this problem whether or not they accept the reality of the crisis.

As the adverse effects of climate change start to impact more populations in the US, the players and power dynamic will change, but over the next year the key players worth considering are individual states, Congress, the courts, key administration agencies, industry groups and think tanks, and finally, the general public.

In many cases, individual states have shown to be leaders in providing policy solutions to climate change. States and regions have successfully passed significant "high-profile policies such as cap-and-trade programs, renewable portfolio standards, and climate action plans."[135] States are also primary players in implementing federal policies, as will be the case with developing and implementing SIPs for CPP, similar to the NAAQS process. That is not to say that all state leaders support regulatory action generally or their role in implementing federal policy. This is evident in the fact that 29

[134] President Obama, "Executive Order -- Preparing the United States for the Impacts of Climate Change," The White House, November 2013, 1.
[135] C2ES, "Climate Change 101: State Action," Center for Climate and Energy Solutions, Accessed March 2016, http://www.c2es.org/docUploads/climate101-state.pdf

states joined the lawsuit against the CPP, compared to only 18 states that filed motions in support.[136]

While the current Congress is indeed a key constituent of the crisis, it has removed itself as a principal player in policy development and it is unlikely it will support any future policy proposals from the White House. Congress has not passed any significant climate related legislation since ARRA and it appears that neither the current House nor Senate intends to do so over the next year. Further, it is unlikely that any significant legislation would even receive a committee hearing in the House as the majority of the members on the House Committee on Science, Space, and Technology reject anthropogenic global warming.[137] It is worth noting that the Senate will be a principal player in the effort for the Administration to appoint a Supreme Court Justice, which could have significant ramifications for the landmark CPP and future efforts to regulate GHG emissions.

The judicial branch has had a large impact on climate change policy and could be a principal player moving into the final year of the Administration. The CPP is in the hands of the Court of Appeals and potentially the Supreme Court over the next year or more. Any new legal action against current or future policy options is unclear, particularly with the nature of the Federal Rules of Appellate Procedure (FRAP), which randomly assigns judges to decide on lower court rulings.[138] Also, the vacancy in the

---

[136] National Conference of State Legislatures, "States' Reactions to EPA Greenhouse Gas Emissions Standards," NCSL, Accessed March 2016, http://www.ncsl.org/research/energy/states-reactions-to-proposed-epa-greenhouse-gas-emissions-standards635333237.aspx

[137] Jeremy Schulman, "72 Percent of Republican Senators Are Climate Deniers," Mother Jones, January 2015,
http://www.motherjones.com/blue-marble/2015/01/republican-climate-denial-caucus

[138] Ninth Circuit Rules, "Federal Rules Of Appellate Procedure," Ninth Circuit Court, January 2015, 3.

Supreme Court makes it difficult to anticipate future rulings, although it is unlikely that any current or proposed policy would be on the Supreme Court docket in the next year.

Internal to the Administration, it is clear that the EPA is the principal player, and will continue to be into the final year of the Administration. There are a few other important agencies of note, namely the Departments of Energy and Transportation, the National Aeronautics and Space Administration (NASA), NOAA, and the US Global Change Research Program. One of the critical considerations for the last year of the Administration is retaining key officials in these agencies to ensure that progress will continue to be made on current and any possible new policies related to climate change. This is particularly important in the case of Administrator Gina McCarthy, the head of the EPA, who has been leading the fight to regulate GHG emissions since replacing Administrator Lisa Jackson.[139] Administrator McCarthy's nomination was controversial in the Senate and it took 136 days and more than a thousand questions for her to be confirmed.[140] Replacing the Administrator at this crucial time would be a lengthy and difficult process and a major setback for climate change policy.

Other primary constituents and principal players in climate change are those that will likely be impacted by regulatory action, namely corporate and industry groups. On a whole, there has been widespread opposition to regulation by the federal government from the private sector.[141] This is evident in the lawsuit against the CPP, where dozens of

[139] EPA, "Gina McCarthy," About EPA, Accessed February 2016, http://www.epa.gov/aboutepa/administrator-gina-mccarthy
[140] Ramsey Cox and Ben Geman, "Senate Votes 59-40 to Confirm McCarthy as EPA Administrator," The Hill, July 2013, http://thehill.com/blogs/floor-action/senate/312093-senate-votes-59-40-to-confirm-mccarthy-as-epa-administrator
[141] Influence Map, "Uncovering Corporate Influence over Climate Change," InfluenceMap.org, Accessed February 2016, http://influencemap.org/page/Measuring-Corporate-Influence-of-Climate-Change-Policy

industry representatives, including the largest coal company in the US, Peabody Energy Corporation, and a number of trade associations, joined the 29 states as plaintiffs.[142] As is the case with CPP, any major policy solution to address climate change is likely to disrupt business operations in a number of sectors, and it is safe to assume varying levels of opposition from affected parties.

There are a plethora of think tanks and citizen groups that research and provide analysis on the crisis itself as well possible policy responses. Some of the key ones that oppose regulatory responses to climate change are the American Enterprise Institute, Americans for Prosperity, Cato Institute, and Heritage Foundation.[143] In support, key players are the Brookings Institute, Progressive Policy Institute, the Center for American Progress, and a number of advocacy groups such as 350.org, Center for Biological Diversity, Natural Resources Defense Council, Union of Concerned Scientists, and the US Climate Action Network.[144] These groups aim to insert their perspectives into the scientific and policy debate and influence key decision-makers and the public.

The general public is a critical player in this crisis as well as in possible policy solutions. The adverse effects of climate change will increase in severity and frequency and affect individual life and property[145] across regions, socio-economic status, and profession. Policy solutions could have a number of positive and negative effects on various populations in the United States as well. The public view of the crisis and of

[142] District of Columbia Circuit, "No. 14-1112 Opinion," United States Court of Appeals, June 2015, 1-2.
[143] Union of Concerned Scientists, "Global Warming Skeptic Organizations," UCS, Accessed February 2016, http://www.ucsusa.org/global_warming/solutions/fight-misinformation/global-warming-skeptic/
[144] GuideStar USA, "Ranked Nonprofits: National Climate Change," Philanthropedia, Accessed February 2016, http://www.myphilanthropedia.org/top-nonprofits/national/climate-change/2012
[145] Melillo, Richmond, and Yohe, "Climate Change Impact in the United States," 10.

possible policy solutions is critical as it is likely to influence all the aforementioned players and constituencies.

Policy Proposal

Under this proposal, President Obama would issue an executive order directing the EPA to use its authority under section 108 of the CAA to list six greenhouse gases (CO2, CH4, N2O, HFCs, PFCs, and SF6) as criteria pollutants and establish National Ambient Air Quality Standards (NAAQS) for each GHG pollutant as directed under section 109 of the CAA.[146] In addition, the EPA should assist states with the development of individual SIPs to meet established NAAQS as directed under section 110 of the CAA.[147]

Policy Authorization Tool

The policy authorization tool for this policy proposal is executive authority, specifically the authority of the President to issue executive orders directing government officials and executive agencies to "perform duties consistent with the law."[148] Presidents use these orders "to achieve policy goals, set uniform standards for managing the executive branch, or outline a policy view intended to influence the behavior of private citizens."[149] The use of executive orders is derived from an implied authority found in Article II of the US Constitution that "the executive power shall be vested in a President of the United

[146] Robin Bravender, "Groups Petition EPA to Set Greenhouse Gas Limits Under Clean Air Act," NY Times, December 2009, http://www.nytimes.com/gwire/2009/12/02/02greenwire-groups-petition-epa-to-set-greenhouse-gas-limi-40485.html
[147] 42 US Code § 7410, 1.
[148] Vivian Chu and Todd Garvey, "Executive Orders: Issuance, Modification, and Revocation." CRS, April 2014, 3.
[149] Chu and Garvey, "Executive Orders: Issuance, Modification, and Revocation," 1.

States," and "[the President] shall take care that the laws be faithfully executed."[150] If an executive order is issued under Constitutional or statutory authority and published in the Federal Register and Code of Federal Regulations (CFR), it has the full "force and effect of law" and "courts are bound to take notice, and to which all courts are bound to give effect."[151] Presidential directives have been used since the beginning of the US Government,[152] with President George Washington issuing the first order to executive officials in June of 1789.[153] Since then, almost every President in American History has issued an executive order.[154]

In the case of this policy proposal, the President would use his executive authority to issue a new executive order to direct the EPA to list six GHG as criteria pollutants and establish NAAQS for each pollutant. The statutory authority for the executive order would be found in Section 108 of the CAA, which states that the EPA Administrator shall, for the purpose of establishing NAAQS, issue air quality criteria for any air pollutant that (A) "endangers public health and welfare," and (B) is emitted from "numerous or diverse mobile or stationary sources."[155] On December 7th, 2009, the EPA's "endangerment finding" classified six GHG as air pollutants and found that they threaten public health and welfare[156] following the Supreme Court's ruling in *Massachusetts vs. EPA* that "greenhouse gasses fit well within the [Clean Air] Act's capacious definition of "air pollutant,"" and "has statutory authority to regulate emission

[150] US Const., Art. II, Secs. 1, 2, & 3.
[151] Staff of House Comm. on Government Operations, 85th Cong., 1st Sess., "Executive Orders and Proclamations: A Study of a Use of Presidential Powers," US Congress, December 1957, 5.
[152] John Contrubis, "Executive Orders and Proclamations," CRS, March 1999, 6.
[153] Relyea, "Presidential Directives: Background and Overview," 6.
[154] Gerhard Peters and John T. Woolley, "Executive Orders," The American Presidency Project, Accessed March 2016, http://www.presidency.ucsb.edu/data/orders.php.
[155] 42 US Code § 7408, 1.
[156] Federal Register, "40 CFR Chapter 1," US Government, Accessed March 2016, December 2009, 3.

of such gases."[157] These six GHGs come from numerous and diverse sources across the agriculture, industrial, commercial, residential, transportation, and electricity generation sectors,[158] and thus potentially meet the two central criteria under Section 108 and could be regulated accordingly.

Policy Implementation Tool

The policy implementation tool for this proposal would be regulatory enforcement. The executive order would instruct the EPA within 30 days to list the six GHGs as criteria pollutants and regulate them under the CAA, as is done for the current six criteria air pollutants. The order would request the EPA to issue air quality standards for each pollutant based on the "latest scientific knowledge" and as soon as possible, but no later than 12 months upon listing the pollutant as required under Section 108a(2).[159] Section 109a of the CAA requires the EPA to simultaneously propose NAAQS upon issuance of any new air quality standards. The EPA would need to provide "reasonable time" for public comments on the NAAQS, but no longer than 90 days "after the initial publication of such proposed standards."[160] Upon establishment of NAAQS for each air pollutant, states have up to three years to submit SIPs that "outline the strategies and emissions control measures" for "implementation, maintenance, and enforcement" of each NAAQS[161] as required by CAA Section 110.[162] After submitting the SIPs, the EPA would need to either approve or disapprove each plan and allow a public comment period

[157] Justice Stevens, "Massachusetts Et Al. V. Environmental Protection Agency Et Al," US Supreme Court, April 2007, 4.
[158] 42 US Code § 7409, 1.
[159] 42 US Code § 7408, 1.
[160] 42 US Code § 7409, 1.
[161] EPA, "NAAQS Implementation Process," Climate Change Program, Accessed March 2016, https://www.epa.gov/criteria-air-pollutants/naaqs-implementation-process
[162] 42 US Code § 7410, 1.

before final action is taken. If individual states do not submit an SIP within two years, the EPA is required to develop a Federal Implementation Plan (FIP) for the state, which is enforceable in federal court.[163] Once SIP's are approved and implemented, every state is required to monitor results through State and Local Air Monitoring Stations (SLAMS) and report annual summaries to the EPA's Office of Air Quality Planning and Standards (OAQPS) and relevant regional EPA office to ensure states are meeting emission standards.[164]

Policy Analysis

Pro

The most significant advantage to this policy option is its potential effectiveness in reducing targeted GHG emissions. NAAQS for the current six criteria pollutants provide a uniquely relevant case study to the effectiveness of this policy proposal. The national concentrations of criteria air pollutants decreased dramatically from 1980 to 2014, with lead decreasing by 98%, carbon monoxide by 85%, sulfur dioxide by 80%, nitrogen dioxide by 60%, ozone by 33%, fine particle concentrations by 36%, and coarse particles by 30%.[165] SIPs for these pollutants have been adopted by all states as dictated by individual state conditions,[166] and have shown to be effective at targeting difficult issues, as illustrated by the fact that all 41 areas designated as not meeting carbon monoxide

[163] EPA, "NAAQS Implementation Process," 1.
[164] EPA, "Air Pollution Monitoring," Climate Change Program, Accessed March 2016, https://www3.epa.gov/airquality/montring.html
[165] EPA, "Progress Cleaning the Air and Improving People's Health," CAA Overview, Accessed March 2016, https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health#pollution
[166] EPA, "Status of SIP Requirements for Designated Areas," SIP Status and Information, Accessed March 2016, http://www3.epa.gov/airquality/urbanair/sipstatus/reports/map_s.html

standards in 1991 are now in compliance.[167] Further, the NAAQS and SIPs have found significant reductions across all five major emission sources,[168] which are identical to the sectors that produce the majority of the GHGs regulated under this proposal. It is also important to note that although the current criteria pollutants were adopted at different stages over a thirty year period, have unique control considerations, and vary in source and region, the EPA and states have successfully regulated them and effectively lowered concentration levels.

Efficiency is another advantage of this policy proposal. Research has shown that state implementation, maintenance, and enforcement of federally mandated standards would maximize efficiencies and cost-effectiveness for regulating GHG emissions, particularly compared to a federally run program. The Center for Climate Strategies (CCS), in conjunction with outside researchers, developed cost effectiveness curves for twenty individual state GHG reduction plans and simulated a scaling-up under a federal system and found that "a comprehensive federal system that coordinated and incorporates individual plans" maximizes economic efficiencies.[169] This policy structure promotes efficiency as it "preserves existing progress at a state level" and "relies on better state specific information."[170] Also, states have primary authority over a number sectors that could be critical to decreasing GHG emissions that the federal government has not historically or effectively regulated, such as "land use, building codes and standards,

[167] EPA, "Progress Cleaning the Air and Improving People's Health," 1.
[168] EPA, "The Benefits and Costs of the Clean Air Act from 1990 to 2020," Office of Air and Radiation, March 2011, 13.
[169] Robert McKinistry, Thomas Peterson, Adam Rose, and Dan Wei, "The New Climate World: Achieving Economic Efficiency in a Federal System for GHG Regulation through State Planning." The Center for Climate Strategies, March 2009, http://www.climatestrategies.us/library/library/view/969
[170] Robert McKinistry, et al., "The New Climate World," 45.

utility regulation, water supply, transportation planning, municipal waste, agriculture and forestry."[171] Most importantly, by allowing states to individualize SIPs based on a "mix of greenhouse gas emission reduction measures, strategies, and market and non-market approaches appropriate for each state," which could include cap-and-trade or emission tax schemes, the SIPs will "produce a more cost-effective approach than a single federal plan."[172]

Another advantage of this policy proposal is the possible overall impact to the economy. As a case study, the economic benefits of the CAA from 1970 to 1990 are estimated to be between $5.6 and $49.4 trillion, with a mean of $22.2 trillion, coming from "reduced incidence of a number of adverse human health effects, improvements in visibility, and avoided damage to agricultural crops."[173] The EPA estimates that there will be another $2 trillion in savings by 2020 from reduced pollutants, which is a 30-1 cost-benefit ratio.[174] In addition, the CCS study found that a federally mandated GHG emission run by states would lead to an estimated net economic savings of $85 billion in 2020 and a cumulative savings of $535.5 billion over a ten year period.[175] The savings are projected to come from decreased costs from reduced energy demand at the business, household, and consumer level as well as increased investment and subsequent job creation for developing new domestic energy supplies and infrastructure projects.[176] In addition, the Congressional Budget Office (CBO) estimated that if climate change was

[171] Robert McKinistry, et al., "The New Climate World," 4.
[172] Kassie Siegel and Gillian Boeve, "Petition to Establish National Pollution Limits for Greenhouse Gases Pursuant to the Clean Air Act," Center for Biological Diversity and 350.org, December 2009, 40.
[173] EPA, "The Benefits and Costs of the Clean Air Act from 1970 to 1990," Office of Air and Radiation, October 1997, 2.
[174] EPA, "Progress Cleaning the Air and Improving People's Health," 1.
[175] Robert McKinistry, et al., "The New Climate World," 32.
[176] Robert McKinistry, et al., "The New Climate World," 33.

left unabated the cost could be as much as 5% of GDP by 2050,[177] which illustrates the economic dangers of inaction.

Another advantage of this proposal is the existing administrative capacity on both the state and federal level for the development and implementation of the proposed policy. For the development of individual NAAQS, the Clean Air Scientific Advisory Committee (CASAC) has been providing technical and independent guidance to the EPA to set standards for criteria pollutants since 1977.[178] The EPA's OAQPS and the ten Regional Offices have decades of experience working with states, localities, and tribes to develop, implement, and monitor SIPs for criteria pollutants. In addition, the Clean Air Act Advisory Committee (CAAC), a group of senior experts in federal and local governments, public interests groups, academics, and industry, has provided assistance and guidance on issues related to the implementation of the CAA since 1990.[179] On the state level, each state has significant experience developing, implementing, and monitoring SIPs and has existing SLAMS and a shared database, the Air Quality Subsystem (AQS), to monitor their progress towards meeting standards.[180] Further, the National Association of Clean Air Agencies (NACAA), an association of 40 states, DC, four territories, and 116 metropolitan areas, is designed to "enhance communication and cooperation" towards efficient and effective implementation of the CAA, among other

[177] Nicholas Stern, "Stern Review on the Economics of Climate Change," Cambridge University Press, October 2006, 2.
[178] EPA, "Clean Air Scientific Advisory Committee," CASAC Overview, Accessed March 2016, https://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/CASAC
[179] EPA, "Clean Air Act Advisory Committee," CAAAC Overview, Accessed March 2016, http://www.epa.gov/caaac/learn-about-caaac
[180] EPA, "Air Pollution Monitoring," Air Quality Planning and Standards, Accessed March 2016, https://www3.epa.gov/airquality/montring.html

related efforts.[181] These existing federal and state administrative structures and support systems have the mandate and capacity to serve identical roles under this policy proposal.

This policy option would also have a negligible impact to the federal budget, particularly compared to a program run directly by the federal government. Since states have the statutory requirement to "implement, maintain and enforce" the NAAQS,[182] the majority of the cost of this regulatory action would fall on the states. It is likely that the EPA's OAQPS would need to either hire additional staff or reprioritize existing resources to manage the development of standards, the rulemaking process, reviewing of SIP proposals, and the annual monitoring of state progress, however much of the existing infrastructure for this action exists today. As a precedent, the CPP is a state run policy that originated from an executive directive, required similar action by the EPA, and was not provided any additional federal funds from Congress.[183]

The legal basis of this proposal is also potentially advantageous. The Supreme Court ruling in *Massachusetts vs EPA* and subsequent endangerment rulemaking by the EPA provides a firm legal foundation for regulating GHGs under Section 108 of the CAA. Further, the Second Circuit Court ruled in *Natural Resources Defense Council v. Train* that once the EPA determined that a pollutant has adverse effects on public health and welfare, in this case lead, it is required to list it as a criteria pollutant under the CAA.[184] The policy authorization tool of this proposal, an executive order, also has a

[181] NACAA, "Stakeholders," About NACAA, Accessed March 2016, http://www.4cleanair.org/
[182] 42 US Code § 7410, 1.
[183] David Henry, "Spending bill keeps EPA funding flat in 2016," The Hill, December 2015, http://thehill.com/policy/energy-environment/263411-spending-bill-keeps-epa-funding-flat-in-2016
[184] Judge Stewart, "Natural Resources Defense Council v. Train," US District Court New York, March 1976, 1-2.

long legal history in instructing agencies to "perform duties consistent with the law,"[185] including the recent executive actions that regulated GHG emissions from cars and power plants. Finally, the CAA provides a clear legal framework for policy implementation once a pollutant has been designated a criteria pollutant by the EPA Administrator.

Another advantage of this policy proposal is the policy authorization tool does not require action by Congress. Passing legislation is time consuming and a generally futile exercise, especially with the parliamentary hurdles in the Senate and a divided government. The House and Senate have indicated on a number of occasions that climate change and possible policy responses is not a priority. Also, Congress and the White House reached a two-year budget deal in the fall,[186] which should allow the EPA sufficient time to set NAAQS and move through the rulemaking process before Congress could interfere with the EPA's budget.

Con

Conversely, one of the most significant disadvantages to this policy option is its potential effectiveness to reach its target impact: slowing or reversing climate change. The cap for each GHG emission would be set by the EPA and it is not clear if the reductions would be significant enough to meet the COP21 pledge or, even more importantly, to have a significant impact on climate change. Further, since GHG emissions are an inherently global issue, actions by other countries are equally important to addressing climate change, but also out of the immediate control of the US government. It is possible that

[185] Chu and Garvey, "Executive Orders: Issuance, Modification, and Revocation," 3.
[186] David Herszenhorn, "Congress Strikes a Budget Deal with the President," New York Times, October 2015, http://www.nytimes.com/2015/10/27/us/politics/congress-and-white-house-near-deal-on-budget.html?_r=0

any significant progress made by the US under this policy could be offset by China, the largest GHG emitter,[187] or others falling short of their COP21 commitments. Further, it is believed by some in the scientific community that the commitments made at COP21 are not significant enough to keep the planet from warming by 2°C, which is the general scientific consensus for preventing some of the more catastrophic effects of climate change.[188] To compound these issues, the 2°C figure and the future effects of GHG emissions are based on models, whose projections have a fairly wide range of possible outcomes.[189]

While there could be greater benefits to some segments of the economy to offset these costs, it is clear that this policy would put significant financial burdens on businesses, the public, and governments. Again the CAA provides a valuable case study. The EPA, with outside consultation, produced two reports on the costs and benefits of the Clean Air Act between 1970 to 1990 and 1990 through 2020 respectively. The general consensus in both reports was that businesses, consumers, and government entities all "incurred higher costs for many goods and services" to comply with the CAA, primarily from "requirements to install, operate, and maintain pollution abatement equipment" and "design and implement regulations, monitor and report regulatory compliance, and invest in research and development."[190] While most of these direct costs were incurred by business and industry, the higher production costs were eventually passed down to consumers and taxpayers. From 1970 to 1990, these costs were estimated to be

[187] EPA, "Global GHG Emissions," Climate Change Program, Accessed March 2016, http://www3.epa.gov/climatechange/ghgemissions/global.html
[188] Kalina Oroschakoff, "Paris Talks Won't Hit Global Warming Target, UN Warns," Politico, September 2015, http://www.politico.eu/article/paris-talks-global-warming-target-un-cop21-figueres/
[189] Pachauri and Meyer, "Climate Change Report 2014," 10-13.
[190] EPA, "the Benefits and Costs of the Clean Air Act from 1970 to 2020," 30.

approximately $523 billion[191] and the projected costs from 1990 to 2020 is $65 billion.[192] Also, a review by the CBO found that the cost of reducing GHG emissions would be between 1 to 3.5 percent of GDP by 2050.[193]

This policy option would also lead to significant market disruptions, particularly compared to alternatives. In the case of the carbon tax or a cap-and-trade system, Congress would likely set tax rates and emission levels carefully based on economic models and input from effected parties. In the case of this proposal, emissions levels would be set by the EPA based scientific research and technological expertise, which if they end up being more restrictive, would lead to additional market disruptions. It is important to note that the level of market disruption would vary between states as individual SIPs are allowed to use a variety of tools to meet the emission standards. In addition, variations of policies between states to address this negative externality could lead to a market disruption in itself, as policies would not be consistent across state lines and some industries might face differing regulations if they operate facilities in one or more states. As has been seen in a number of industries, regulatory regimes that provide "uneven and inconsistent treatment of market players" can lead to market failures.[194] In addition, there are a number of sectors in each of these states that might not have been historically regulated for GHGs, such as agriculture and residential buildings, which could lead to a number of unintended consequences, such as higher food and rent prices and/or shortages.

---

[191] EPA, "the Benefits and Costs of the Clean Air Act from 1970 to 2020," 30-31.
[192] EPA, "A Study of the Benefits and Costs of the Clean Air Act from 1990 to 2020," 1.
[193] Nicholas Stern, "Stern Review on the Economics of Climate Change," 2.
[194] Christian Jaag and Urs Trinkner, "An Economic Framework to Understand and Assess Regulations in Network Industries," Swiss Economics, 2010, 4.

From the state perspective, it is also possible that there are less expensive alternatives. It is clear that a federally developed, implemented, and monitored policy would be less costly for individual states as the majority of the financial responsibilities would fall on the federal government. The proposed policy is an unfunded mandate and would likely require states to add additional enforcement personnel and resources to the current CAA infrastructure. These costs would need to come state budgets in order to develop SIPs and implement and monitor progress in meeting the new standards.

Another disadvantage of this policy proposal is time efficiency as this policy would be developed and implemented over a long timeline. The rulemaking process and generous timeframes provided in the CAA for development of SIPs means that it could be over four years from the designation of GHGs as criteria pollutants until states start regulating GHGs. Alternative policy options, particularly if they were developed through the legislative process, could shorten this timeline and potentially encourage a quicker response. For example, this Congress could pass a carbon tax and theoretically start collecting the revenue as early 2018, a similar timeline for the recently passed economy-wide carbon tax in the Alberta Province in Canada.[195]

Technical Capacity is another possible disadvantage of this policy proposal. While there are longstanding state and federal entities that are well suited for implementing this policy proposal from an administrative perspective, the science of GHGs and their harm to human health and welfare through climate change is significantly different than the current criteria pollutants and their more immediate affects

[195] Washington Post Staff, "Alberta to introduce economy-wide carbon tax in 2017," November 2015, https://www.washingtonpost.com/world/alberta-to-introduce-economy-wide-carbon-tax-in-2017/2015/11/22/c83adec4-916d-11e5-8aa0-5d0946560a97_story.html

to local populations. For the current criteria pollutants, the focus has been on decreasing "local concentrations of pollutants that disperse rapidly,"[196] which have a range of negative effects to local populations in the form of lung and heart diseases, among others.[197] In the case of GHGs, they "mix rapidly throughout the atmosphere" and can remain there for a century.[198] The adverse effects to human health and welfare from GHG emissions are also far more delayed and uniquely national or even global in scope. As a result of these considerations, a significant amount of technological capacity would need to be developing throughout the implementation apparatus. The EPA, with technical guidance from CASAC, would need to develop a new process for setting emission levels for GHGs based on recent scientific consensus and states would have new and unique technical challenges to develop and implement SIPs for GHG emissions.

There are also serious questions whether this policy would survive into the next administration. One of the most significant downsides of executive directives is that they are easily reversed by the next president. This has happened on a number of occasions including by President Obama who reversed two of President George W. Bush's executive orders within the first month of the Presidency.[199] Depending on the policy preferences of the next president, this executive order could be partially or completely reversed before one or all of the regulated GHGs are issued final rules. Congress will also likely weigh into the debate and could try to gather numbers sufficient to override a veto. In addition, it is likely there will be a number of lawsuits against the EPA and the courts

[196] Robert McKinistry, et al., "The New Climate World," 4.
[197] Alan Lockwood, "How the Clean Air Act Has Saved $22 Trillion in Health-Care Costs," The Atlantic, September 2012, http://www.theatlantic.com/health/archive/2012/09/how-the-clean-air-act-has-saved-22-trillion-in-health-care-costs/262071/
[198] Robert McKinistry, et al., "The New Climate World," 1.
[199] President Obama, "Executive Order 13497," The White House, February 2009, 1.

would weigh in on the proposal before it would be fully implemented. There is an additional inherent danger of pushing this issue to the courts as it is possible that a less supportive Supreme Court could take the opportunity to reverse their ruling in *Massachusetts vs EPA,* and the progress made on CAFE standards and the CPP could be halted. Even if final rules are issued before the end of the Obama Presidency, the next president, Congress, and/or the courts will decide whether or not the proposal will be fully implemented.

Political Analysis

The political environment surrounding climate change and possible policy responses is fragmented, divisive, and politically charged. The three branches of the federal government cross the ideological spectrum on this issue, with the majority of Congress in opposition,[200] [201] the Supreme Court split,[202] and the executive branch favoring federal action.[203] While a majority of states are taking some action against climate change,[204] a majority also appear to be opposed to federally mandated regulations.[205] The private sector has generally been opposed to regulation, but there are exceptions.[206] There are a plethora of think tanks and citizen action groups on either side of the debate, looking for

[200] US Congress, "HR 424," Library of Congress, Accessed February 2016, https://www.congress.gov/bill/114th-congress/house-resolution/424/cosponsors
[201] US Congress, "S. 1," Library of Congress, Accessed February 2016, https://www.congress.gov/bill/114th-congress/senate-bill/1/text
[202] Lawrence Hurley, "Scalia's death boosts legal chances for Obama's climate plan," 1.
[203] The White House, "Climate Change," White House, December 2015, https://www.whitehouse.gov/climate-change
[204] C2ES, "State Climate Action Plans," Center for Climate and Energy Solutions, Accessed March 2016, http://www.c2es.org/us-states-regions/policy-maps/climate-action-plans
[205] National Conference of State Legislatures, "States' Reactions to EPA Greenhouse Gas Emissions Standards," 1.
[206] District of Columbia Circuit, "No. 14-1112 Opinion," United States Court of Appeals, June 2015, 1-2.

opportunities to influence decision-makers and the public,[207] [208] but the opposition has historically had far more resources.[209] The majority of the US public appears to support action,[210] but not at levels seen in the larger international community.[211] These different stakeholders have been battling in the public arena to assert their positions for decades, but it is clear from the lack of action in Congress, that the opposition has generally succeeded at the federal level.

Congress has shown to be either unwilling or unable to pass any significant legislation to address climate change. The Republican Party controls Congress with a 246 to 188 majority in the House and 54 to 46 majority in the Senate[212] and only a small fraction of the Republican caucuses have publicly confirmed that climate change is both real and is driven by human emissions of GHGs. In the House, 11 Republicans or 4.5% of the caucus signed onto H. Res 424, a nonbinding resolution affirming that climate change is an issue that deserved further action.[213] The resolution was referred to committee, but no further action was taken.[214] It is unlikely that any significant legislation would even receive a committee hearing as the majority of the members on the House Committee on Science, Space, and Technology reject anthropogenic global

[207] GuideStar USA, "Ranked Nonprofits: National Climate Change," 1.
[208] Union of Concerned Scientists, "Global Warming Skeptic Organizations," 1.
[209] Suzanne Goldenberg, "Secret Funding Helped Build Vast Network of Climate Denial Think Tanks," The Guardian, February 2013, http://www.theguardian.com/environment/2013/feb/14/funding-climate-change-denial-thinktanks-network
[210] Frank Newport, "Smaller Majorities in US Favor Gov't Pollution Controls," Gallup, June 2014, http://www.gallup.com/poll/170885/smaller-majorities-favor-gov-pollution-controls/
[211] Richard Wike, "What the World Thinks about Climate Change," Pew Research Center, November 2015, http://www.pewresearch.org/fact-tank/2015/11/05/what-the-world-thinks-about-climate-change-in-7-charts/
[212] Office of the Clerk, "Congressional Profile," US House of Representatives, Accessed February 2016, http://clerk.house.gov/member_info/cong.aspx
[213] US Congress, HR 424, 1.
[214] US Congress, HR 424, 1.

warming.[215] In the Senate, only five Republicans (Sen Lamar (R-TN), Sen Ayotte (R-NH), Sen. Collins (R-Maine), Sen. Graham (R- SC), and Sen. Kirk (R-IL)) voted for Sen. Schatz's (D-HI) amendment to S.1, the Keystone XL Pipeline Approval Act, which confirmed that human-caused climate change is real.[216] While that amendment was overwhelmingly supported by the Democratic caucus and received 50 votes, it did not reach the filibuster proof majority that would be required to have major climate change legislation pass the Senate.[217] It is also important to note that even when the Democrats had strong majorities in the House and Senate, they were only able to pass ACES out of the House and it never came to the Senate floor for debate.[218]

The courts are also key political player in this policy issue as is evident by the landmark 5-4 Supreme Court ruling in *Massachusetts vs. EPA* that led to two of the most significant federal polices to combat climate change: the increasing regulation of emissions from vehicles and power plants, as well as a central legal foundation for this proposal. However, the recent halt of the implementation of the CPP, with Justice Kennedy switching sides and the death of Justice Scalia, has left the role of the Supreme Court less clear going forward.[219] The Supreme Court appears to be split on the issue of regulating GHG gases, which increases the influence of the US Court of Appeals as the lower court's ruling would stand with a split higher court. Since appellate justices are randomly assigned to cases based on FRAP,[220] it is difficult to judge how they might rule on this policy proposal. While it could be argued that a split court benefits the

[215] Jeremy Schulman, "72 Percent of Republican Senators Are Climate Deniers," 1.
[216] US Congress, S.1, 1.
[217] US Congress, S.1, 1.
[218] US Congress, HR 2454, 1.
[219] Lawrence Hurley, "Scalia's death boosts legal chances for Obama's climate plan," 1.
[220] Ninth Circuit Rules, "Federal Rules Of Appellate Procedure," 3.

Administration in the short-term depending on the assigned appellate judges, it is likely that the next Supreme Court Justice will be the deciding vote on whether or not GHG can be regulated under the CAA over the long-term. The current Supreme Court nominee, Merrick Garland, has shown in his past opinions to be deferential to federal agencies,[221] which is an indication he could be supportive of the EPA regulating GHG under the CAA.

There is also a significant split between states on the issue. Currently, 31 states and the District of Columbia have completed climate action plans[222] and there are a number of regional organizations working to reduce GHG emissions such as the Northeast Regional Greenhouse Gas Initiative and the West Coast Governors' Global Warming Initiative.[223] A number of states on the West Coast and in the northeast have instituting substantial policies to lower GHG emissions,[224] with California as one of the central leaders in this effort.[225] In fact, 31 states are already more than half way to the 2020 target for CO2 emissions under the CPP, and 14 of those are projected to exceed the target.[226] However, the CPP provides an important barometer if states would support this policy proposal. A majority of states, 29 in total, joined the lawsuit against the CPP,

[221] Robert Barnes, "The Respectful Disagreements of Judge Merrick Garland." The Washington Post, March 2016, https://www.washingtonpost.com/politics/courts_law/the-respectful-disagreements-of-judge-merrick-garland/2016/03/18/7f8eee4e-ed17-11e5-b0fd-073d5930a7b7_story.html?hpid=hp_hp-top-table-main_garlanddissents749pm%3Ahomepage%2Fstory
[222] C2ES, "State Climate Action Plans," 1.
[223] C2ES, "Climate Change 101: State Action,"1.
[224] Chris Megerian and Michael Finnegan, "California's Greenhouse Gas Emission Targets are Getting Tougher," LA Times, April 2015, http://www.latimes.com/local/political/la-me-pc-jerry-brown-orders-emission-targets-for-climate-change-20150429-story.html
[225] C2ES, "Climate Change 101: State Action," 1.
[226] Union of Concerned Scientists, "Most States on Track to Meet Clean Power Plan 2020 Benchmarks," UCS, Accessed March 2016, http://www.ucsusa.org/news/press_release/most-states-on-track-to-meet-cpp-benchmarks-0500#.VtsUS_krKUk

compared to only 18 states filing motions in support.[227] It is safe to assume that the state opposition to this policy proposal would be equal to or even greater than to the CPP. While this proposal provides significant flexibility to the states in how they would meet the standards, it is an unfunded mandate and could be more complex to implement and monitor as it would likely regulate more industries than the CPP.

Industries, particularly those regulated under this policy, are key stakeholders and presumably will be opposed to this policy. Again the CPP provides a good example as evident in the lawsuit against the EPA, where dozens of industry representatives and a number of trade associations were plaintiffs.[228] Further, a joint study by UK and US nonprofits found that 45% of the world's 100 largest companies "obstruct climate change legislation,"[229] and the National Academy of Sciences found that significant corporate funding over the past 20 years has gone to "encouraging public skepticism of climate change."[230] This is not to say that all corporate interests are against regulatory actions. Over 365 companies, including General Mills, Mars, Nestle, and Staples, sent letters to voice support for the CPP, stating that these solutions are "cost effective and innovative ways to drive investment and reduce GHGs."[231] In addition, 81 major companies, which included Facebook, Google, and Coca Cola, signed a White House pledge supporting the

[227] National Conference of State Legislatures, "States' Reactions to EPA Greenhouse Gas Emissions Standards," 1.
[228] District of Columbia Circuit, "No. 14-1112 Opinion," United States Court of Appeals, June 2015, 1-2.
[229] Influence Map, "Uncovering Corporate Influence over Climate Change," 1.
[230] Jim Shelton, "Study Looks at the Role of Corporate Funding in Climate Change Discussion," Phys.org, November 2015, http://phys.org/news/2015-11-role-corporate-funding-climate-discussion.html
[231] Peyton Fleming and Meg Wilcox, "365 Companies and Investors Announce Support for EPA's Clean Power Plan," Ceres.org, July 2015, http://www.ceres.org/press/press-releases/365-companies-and-investors-announce-support-for-epa2019s-clean-power-plan

President's commitments at COP21.[232] Finally, clean energy companies are also an important private stakeholder that would likely benefit from this policy and bring some influence,[233] but still pale in comparison to their fossil fuel competitors.[234]

There are a number of think tanks and citizen groups that attempt to influence key decision-makers and the public on climate change and possible policy responses. Some of the organizations that oppose action are the American Enterprise Institute, Americans for Prosperity, Cato Institute, and Heritage Foundation[235] and some of the organizations in favor are the Brookings Institute, the Center for American Progress, 350.org, Union of Concerned Scientists, and the US Climate Action Network.[236] While the organizations supporting policy responses to climate change have a significant amount of data and science to support their arguments, opposition groups have invested an incredible amount of resources to get their message out. Since 2002, nearly $120 million was "distributed to 102 think tanks or action groups" that are opposed to action against climate through conservative trusts.[237] Since 2007, ExxonMobil alone has channeled about $30 million to researchers and activists that oppose regulatory action against climate change.[238] As

[232] Office of the Press Secretary, "White House Announces Commitments to the American Business Act on Climate Pledge," White House, October 2015, 1.
[233] Center for Responsive Politics, "Alternative Energy Production & Services," OpenSecrets.org, Accessed February 2016, https://www.opensecrets.org/industries/indus.php?ind=E1500
[234] Center for Responsive Politics, "Oil & Gas," OpenSecrets.org, Accessed February 2016, https://www.opensecrets.org/lobby/indusclient.php?id=E01&year=2015
[235] Union of Concerned Scientists, "Global Warming Skeptic Organizations," 1.
[236] GuideStar USA, "Ranked Nonprofits: National Climate Change," 1.
[237] Suzanne Goldenberg, "Secret Funding Helped Build Vast Network of Climate Denial Think Tanks," 1.
[238] Suzanne Goldenberg, "ExxonMobil Gave Millions to Climate-Denying Lawmakers despite Pledge," The Guardian, July 2015, http://www.theguardian.com/environment/2015/jul/15/exxon-mobil-gave-millions-climate-denying-lawmakers

history has shown, when climate change policies are up for debate, advocates are heavily outspent by opposition groups.[239]

Relatively strong majorities of the US population believe in climate change and support regulatory responses. Gallup found that 55% of Americans believe that climate change is already happening, and the same percentage cites human activities as the chief cause of global warming.[240] Pew found that 77% of US adults saw global climate change as a threat to the US with 40% citing it as a major threat and 37% as a minor threat.[241] When it comes to government action to address climate change, 64% of US adults support regulating power plant emissions and 60% believe that alternative energies should be made a priority over expanding production of fossil fuels.[242] Gallup also found that 65% of those polled favor setting higher pollution standards for business and industry and 63% support mandatory controls on GHG emissions.[243] Pew found slightly higher numbers with 69% of US adults supporting limits to GHG emissions as part of an international agreement.[244] Breakdowns of these statistics show varying changes in support depending on age, education, and income, but party identification was by far the largest contrast. At 48% and 32% higher rates than Republicans, Democrats believed that climate change is a very serious problem and that the government should limit GHG

[239] Center for Responsive Politics, "Pro-Environment Groups Outmatched, Outspent in Battle over Climate Change Legislation," OpenSecrets.org, August 2010, http://www.opensecrets.org/news/2010/08/pro-environment-groups-were-outmatc/
[240] Lydia Saad, "US Views on Climate Change Stable after Extreme Winter," Gallup, March 2015, http://www.gallup.com/poll/182150/views-climate-change-stable-extreme-winter/
[241] Cary Funk and Lee Raine, "Chapter 2: Climate Change and Energy Issues," Pew Research Center, July 2015, http://www.pewinternet.org/2015/07/01/chapter-2-climate-change-and-energy-issues/
[242] Pew Research Center, Chapter 2: Climate Change and Energy Issues," 1.
[243] Frank Newport, "Smaller Majorities in US Favor Gov't Pollution Controls," 1.
[244] Bruce Stokes, Richard Wike, and Jill Carle, "Public Support for Action on Climate Change," Pew Research Center, November 2015, http://www.pewglobal.org/2015/11/05/2-public-support-for-action-on-climate-change/#lifestyle-changes-seen-as-necessary

emissions respectively.[245] Overall, a strong majority of the general populace appears to both believe in anthropogenic climate change and supports government action to curb GHG emissions.

The international community is also an important stakeholder for this policy proposal as climate change is an inherently global issue. Further, the success of this policy proposal in addressing climate change is both predicated and an influential force on other countries reducing domestic GHG emissions. In the 40 countries surveyed by Pew, 54% of respondents said that they believe that climate change is a very serious problem, with the US and Chinese populations showing the least concern, and 51% said that climate change is already harming people.[246] Further, a large majority, 78%, supported limiting domestic GHG emissions as part of the COP21 agreement.[247] This polling, in conjunction with the fact that 159 countries including the US and China pledged significant reductions in Paris,[248] suggests that there is broad international consensus for policy actions to decrease global GHG emissions.

The most promising political benefit of this policy proposal is the relatively strong public support found for limiting GHG emission generally, and to a slightly lower degree, to do so using mandatory controls as suggested by this policy proposal. Congress is unlikely to act on major legislation in the final year of the Administration and there are limited policy options outside the executive branch, so public perception of the crisis and possible policy responses is critical if the executive is to move unilaterally. Also, there are a large number of states, businesses, interest groups, and elected officials that have

[245] Richard Wike, "What the World Thinks about Climate Change," 1.
[246] Richard Wike, "What the World Thinks about Climate Change," 1.
[247] Stokes, Wike, and Carle, "Public Support for Action on Climate Change," 1.
[248] UNFCCC, "INDC Submissions," 1.

shown to support federal action on climate change and could be coalesced into a sizable coalition behind this proposal. Finally, the authorizing and implementation tools themselves represent one of the central political benefits of this policy. It is possible that final rules could be set for all or a number of these GHGs without significant political interference from opposition parties. As we saw in the case of the CPP, the rulemaking process will likely receive millions of comments, but that did not stop a final rule from being issued with substantial GHG reductions.[249] In addition, EPA's budget is already set through the rulemaking phase and any action by Congress to halt this process could be met with a Presidential veto or filibuster in the Senate by the Democratic minority.

The political costs of this policy proposal are significant. Congressional Republicans, some state leaders, industry groups, and think tanks provide a very powerful and well-funded opposition group that has shown to be effective at killing previous attempts at policy action, as was seen with ACES and with the recent legal halt of the CPP. The arguments might vary between groups, but it is to be expected that this policy proposal will be characterized as executive overreach and an economy killer.[250] The main political cost from this opposition would be that it could usurp any political capital left for the remainder of the Administration and shift focus away from other priorities, particularly the appointment process for a new Supreme Court Justice who could be the deciding vote on whether GHG will be regulated under CAA.

[249] EPA, "Clean Power Plan Factsheet," 1.
[250] Joby Warrick and Steven Mufson, "Foes of Clean-air Rule Plan Multiple-front Battle," Washington Post, August 2015, https://www.washingtonpost.com/national/health-science/opponents-lay-groundwork-for-state-by-state-fight-against-polluton-curbs/2015/08/03/d3418320-3a26-11e5-8e98-115a3cf7d7ae_story.html

The best strategy to limit the political costs would be to organize businesses, members of congress, interest groups, and states around a lobbying and media campaign in support of this policy proposal. This group could balance the political attacks coming from the opposition parties and maintain public support for regulating GHG emissions. Judging by history, this group would need to be uniquely effective against the opposition's message, but if final rules are published before the end of the Presidency and a supportive Justice is appointed to the Supreme Court, it would diminish the opportunities for opposition groups to wield their influence. Also, similar to the opposition group's strategy against the CPP,[251] it could be argued that opening a multiple-front battle on regulating GHG could be beneficial to the survival of the CPP, as stopping this proposal would be a priority over continued litigation over the CPP. Finally, it is possible that this policy option could help to energize and rally Democrats and activist groups in an election year, which could be advantageous to electing a likeminded President and Senators and increase the likelihood of this policy being fully implemented.

Recommendation

The policy and political pros and cons of the policy proposal are both substantial and should be carefully weighed. The pros detail a policy authorizing and implementation tool with a strong track record and an administrative structure that has the capacity to successfully and efficiently decrease GHG emissions and to set emission standards with limited interference, at least initially, from opposition groups. The cons detail a policy option that might come short of slowing or reversing global climate change and would do

[251] Warrick and Mufson, "Foes of Clean-air Rule Plan Multiple-front Battle," 1.

so at a significant cost to markets, businesses, state governments, and consumers. In addition, as a result of the long timeline for implementation, it is possible that the policy would not survive beyond this Administration without support from the next president, Congress and/or the courts.

Of all of these considerations the question of effectiveness is the most important to consider. The United States and the rest of the world continues to get hotter and adverse effects will increase in frequency and severity for populations and economies across the US. There is clear scientific consensus that we must dramatically decrease our GHG emissions if we want to effectively slow or reverse climate change. We can be confident that this policy would set standards based on science, and effectively and efficiently lower GHG emissions in the United States, as Section 108 of the CAA has done successfully with a variety of pollutants for over 30 years. While the effectiveness of this policy in meeting its target is predicated on actions of international stakeholders, the COP21 agreement represents a unique and historic opportunity for the international community, including the largest emitters, to dramatically decrease GHG emissions worldwide. It is too early to tell if these reductions will be significant enough to limit the more adverse effects of climate change, but this is an essential step forward to reach the 2°C target.

The next most important consideration is to determine if this policy is politically feasible and would be allowed to be fully implemented. It is clear that the current Congress is opposed to action on climate change, but Section 108 of the CAA and the current federal budget provide the EPA with a timeline that should allow final rules to be published in the Federal Registrar before the end of the Administration without

significant interference. The next president and Congress would likely try to influence the implementation of the policy and the Supreme Court could have the final word, but this proposal is based in a firm statutory foundation and judicial precedence. If final rules are issued before the end of the Administration, it would be difficult for the next president and Congress to reverse implementation of this policy proposal as the regulation would be codified. Congress could attempt to pass legislation challenging this policy, but Democrats could be in the majority in the next Senate next year or could filibuster in the minority if necessary. In regard to the courts, there are a number of possible scenarios, but most would weigh in favor of the high court supporting the precedence of *Massachusetts vs. EPA*. If Judge Garland is appointed, the balance would presumably be 5-4 in favor of regulating GHG under the CAA. If Judge Garland is not confirmed, there is still the possibility that the next president would appoint a likeminded Supreme Court Justice. If neither of those happens, there is still hope that the Supreme Court would remain split and the appellate court would support judicial precedence, or the possibility that Justice Kennedy could switch back and provide a majority.

We must also seriously consider weighing the cost of this proposal. There are policy alternatives, including doing nothing, which would lead to less market disruption and a smaller financial burden to state governments, businesses, and the public. However, it is difficult to surmise any significant policy response that would not be regulatory in nature and lead to market disruptions and costs to governments, businesses, and consumers. Research has shown that this policy option is uniquely efficient and cost-effective as it allows states to use a variety of tools to meet emission standards within individual constraints and structures, and builds on existing state GHG reduction policies.

There is also evidence that there could be offsetting economic benefits in the form of growing domestic energy sources and efficiencies. Finally, it is expected that the economic costs from the adverse effects of climate change to life and property would greatly outweigh the cost of regulating GHG emissions.

Climate change will have momentous adverse effects to populations in the United States, and we must do everything we can to limit the loss of life and property. It is clear that the legislative branch does not have the ability or will to address climate change, which is not likely to change in the next Congress or the following. As a result, there are few alternatives to this policy option in this difficult and divided political environment that would have a substantial effect on the key cause of climate change, anthropogenic GHG emissions. After significant consideration, I recommend that President Obama issue an Executive Order directing the EPA to use its authority under section 108 of the CAA to list six greenhouse gases (CO2, CH4, N2O, HFCs, PFCs, and SF6) as criteria pollutants, establish NAAQS for each, and start the rulemaking process as soon as possible. Simultaneously, I recommend the White House start building a coalition of elected officials, states, businesses, and interest groups for a media campaign in support of this proposal.

Curriculum Vitae

Kirk Shirley was born in Spokane, Washington on November 1st, 1982. Mr. Shirley obtained a degree in Political Science at Seattle University, and now lives in Somerville, Massachusetts. Mr. Shirley has been with the Foreign Agricultural Service (FAS) at the US Department of Agriculture (USDA) for 7 years and is currently a Senior Program Manager for trade capacity building programs in South Asia and beyond. Prior to joining the Federal Government, Mr. Shirley worked for Congressman Jay Inslee, Congressman Jim McDermott, and Washington State Representative Jamie Pedersen.